

3 a resin which has a refractive index higher than that of said substrate and is filled  
4 in said channel for optical waveguide or is disposed on said substrate;

B2  
C2  
5 wherein the refractive index in a part of said resin varies monotonically in the  
6 direction of light propagation and/or in a direction substantially perpendicular to said  
7 direction of light propagation.

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1 6. (Amended) An optical element comprising:

2 a substrate having or not having a channel for an optical waveguide; and

B3  
3 a material which has a refractive index higher than that of said substrate and is  
4 filled in said channel for optical waveguide or is disposed on said substrate;

5 wherein said optical element further includes a plurality of temperature  
6 controlling elements disposed on said material and for partially changing the  
7 temperature of said material in a direction substantially perpendicular to the direction of  
8 light propagation.

1 7. (Amended) An optical element comprising:

2 a substrate having or not having a channel for an optical waveguide; and

3 a material which has a refractive index higher than that of said substrate and is  
4 filled in said channel for optical waveguide or is disposed on said substrate;

5 wherein said optical element further includes a plurality of electrodes disposed on  
6 said material and for partially changing the electric field in said material in the direction  
7 of light propagation and/or in a direction substantially perpendicular to said direction of  
8 light propagation.

1 8. (Amended) An optical element comprising:

2 a substrate having a channel for an optical waveguide; and

3 a material which has a refractive index higher than that of said substrate and is  
4 filled in said channel for optical waveguide or is disposed on said substrate;

5 wherein said optical element further comprises a part where said material  
6 protrudes to the direction of said substrate and/or a part where said substrate protrudes

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8 to the direction of said material, in the direction of light propagation and/or in a direction substantially perpendicular to the direction of light propagation.

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1 11. (Amended) A method of fabrication of an optical element comprising the  
2 steps of:

By 3 a) forming photo-hardening resin on a substrate; and  
4 b) irradiating light onto said photo-hardening resin, thereby hardening said  
5 photo-hardening resin;

6 wherein the amount of said light irradiation in step (b) is varied.

1 12. (Amended) A method of fabrication of an optical element according to  
2 Claim 11, wherein the amount of said light irradiation in step (b) is varied substantially  
3 periodically or is substantially continuously monotone increasing or decreasing, in a  
4 predetermined direction on the surface of said photo-hardening resin.

1 13. (Amended) A method of fabrication of an optical element according to  
2 Claim 11 or 12, wherein the intensity of said light irradiation onto said photo-hardening  
3 resin in step (b) is varied, whereby the amount of said light irradiation onto the surface  
4 of said photo-hardening resin is varied.

1 14. (Amended) A method of fabrication of an optical element according to  
2 Claim 13, wherein a mask having partially different light transmissivity is used, whereby  
3 the intensity of said light irradiation onto the surface of said photo-hardening resin in  
4 step (b) is varied.

1 15. (Amended) A method of fabrication of an optical element according to  
2 Claim 11 or 12, wherein a light shielding plate is used so as to sequentially change the  
3 region irradiated by said light, whereby the amount of said light irradiation onto said  
4 photo-hardening resin in step (b) is varied.

1 16. (Amended) A method of fabrication of an optical element comprising the  
2 steps of:

3 a) forming photo-hardening resin on a substrate;  
4 b) connecting an optical component to said photo-hardening resin; and

5 c) irradiating light onto said photo-hardening resin, thereby hardening said  
6 photo-hardening resin;

7 wherein said optical component is fixed to said photo-hardening resin when said  
8 photo-hardening resin is hardened in step (c).

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Please add the following claim 19:

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1 19. (Newly Added) An optical element comprising:

2 a substrate having or not having a channel for an optical waveguide; and

3 a material which has a refractive index higher than that of said substrate and  
4 is filled in said channel for optical waveguide or is disposed on said substrate;

5 wherein the refractive index in a part of said material is substantially  
6 continuously monotone increasing or decreasing in the direction of light propagation.

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